MINISTRY OF FORESTS

Engineering Manual

Standard Operating Procedures

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Introduction

The Purpose of the Standard Operating Procedures

The Ministry of Forests' Engineering Standard Operating Procedures are designed to provide ministry staff with:

1. clear direction in applying mandatory engineering practices related to Forest Service roads, *where one approach only is to be followed*; and

2. guidance in implementing "good practices" related to Forest Service roads, *where such practices are recommended but not mandatory*.

For experienced staff working on road projects, the procedures offer a means of ensuring that all job items are properly covered off, in the correct sequence. For personnel who have less experience with road projects, and who are unfamiliar with routine practices (mandatory or simply recommended), the procedures provide a step-by-step process to guide their local operations.

Two Parts to the Procedures

Procedures are outlined for each of the seven main road-related activity areas (from road layout and design to deactivation works). Each set of procedures is laid out as a table, which also includes a column identifying responsibility for the action. There are two parts in each of the seven sets of procedures:

Mandatory Requirements: These are statutory Code items and administrative or technical policies that field staff must follow (except in cases where it can be demonstrated that following such a requirement would not achieve the intended outcome).

Recommended Practices: These are non-statutory, non-policy items that can be characterized as "best management practices." Adhering to recommended practices will help district staff improve their opportunities to succeed at the project level.

What's in the Appendices

The two appendices contain important tools tied to the effective use of the procedures. References to all of these tools—the two project file records and the 13 support aids—appear where appropriate in the procedure tables.

Appendix 1— Project File Records: The *Start-Up Meeting Checklist* and the *Project Tracking Sheet* are two key documents that must be filled out and kept in every project file. Completing these properly is the job of the district person responsible for the project.

- The *Start-Up Meeting Checklist* is the record of the results of discussions with the contractor and the contractor's employees before the job begins.
- The *Project Tracking Sheet* is the record kept by the responsible District Specialist (see below), confirming that key decisions have been made and critical project components carried out.

Appendix 2—Support Aids: These materials—back-up lists, tables and other aids—provide staff with quick-access reference information relevant to the various phases of a road-related project.

Key Players

The key players in the application of these procedures are described below:

District Specialist: The district staff member who, because of his or her particular expertise, is charged with implementing the requirements of the Standard Operating Procedures. This individual acts as overall project manager, administering works contracts and acting as the signing/spending authority for those contracts.

Regional Engineering Specialist: The regional engineering staff member (unless the expertise exists in the district) who, because of his or her particular expertise, is charged with implementing the requirements of the Standard Operating Procedures and making the appropriate professional decisions during the life of a project.

Ministry Representative: An employee or an individual under service contract who is responsible for: a) directing day labour equipment in the field; or b) providing resident or frequent site inspections of contracted works to ensure that the contract requirements are being met, advising the District Specialist of the results of those inspections, and recommending changes where appropriate.

Designer: A professional engineer who is responsible as the engineer of record for all design aspects of a bridge, major culvert or other professionally designed structure.

Layout Person: The specialist (on ministry staff or contracted) who is responsible for conducting field reconnaissance of a road and establishing the proposed road centreline.

Chapter I Road Layout and Design

Planning and Pre-Work Review

(confirming Forest Development Plan content and identifying route corridors)

Mandatory Requirements	**Responsibility**	**Reference**
1. Ensure that proposed roads and stream crossings are identified and approved on current Forest Development Plans.	District Specialist	FPC 60
2. Advise the Regional Engineering Specialist of any professional assessments, measures or design requirements.	District Specialist	
3. Decide whether the Regional Engineering Specialist or an outside consultant will complete the professional assessments, measures and designs.	Regional Engineering Specialist, in consultation with District Specialist	
4. Sign off that road survey and design specifications as per Schedule A1 are suitable or make adjustments as needed, to provide direction to both the Layout Person and the road designer as required (refer to *Project Tracking Sheet* in Appendix 1).	District Specialist	
5. Ensure that standard professional design specifications are suitable (refer to *Project Tracking Sheet* in Appendix 1).	Regional Engineering Specialist, in consultation with District Specialist	
6. Ensure that issues that may affect the project and contract are reviewed and addressed (refer to *Road Layout and Design: Office and Pre-Work* in Appendix 2).		
7. Plan to carry out a road location survey and geometric road design in areas of moderate to high likelihood of landslides or where there is need to facilitate construction or minimize impacts on other forest resources.		
8. Prepare a cost estimate and contract documents for road layout, location survey, geometric design and bridge/major culvert design work (refer to the Ministry of Forests' *Contract Management Manual* and to *Works Contract Documents* in Appendix 2).		
9. Through any turnkey survey or layout contract selection processes, ensure that the contractors are competent to carry out road layout, route survey and road design.		
10. Select appropriate contractors from the Victoria Engineering Equipment and Services list (EES).		

11. As applicable, prepare, award and sign off contracts with the selected reconnaissance contractor (selected on the basis of a proposal review and not a tender) and with the lowest qualified bidder for the survey and design works (assuming the ministry budget can accommodate that price). NOTE: One contractor may perform both functions.		
12. Identify and confirm through an air photo or map review the location of: • cutblocks in the planning unit; • potential unstable terrain; • potential operational bottlenecks (e.g., stream crossings); and route corridors, including alternatives.		
13. Initiate and carry out the assessments required, unless they are timed to be completed with the road layout (refer to *Project Tracking Sheet* in Appendix 1).		
Recommended Practices		
1. Complete a thorough review of the total chance plan, focussing on the physical and economic feasibility of the proposed road development.		
2. Identify any route corridors that require a field check by the Regional Engineering Specialist and/or the District Specialist.	District Specialist	
3. Review debris clearance or management details, as well as plans for meeting *Navigable Waters Act* requirements (as applicable) with bridge designer.	Regional Engineering Specialist	

Start-Up Meeting (with layout and design contractor)

Mandatory Requirements	**Responsibility**	**Reference**
1. Prior to the works, discuss all items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it in the project file.	Ministry Representative, contractor and his/her employees District Specialist	
2. Review specifications for road layout and design, both for field work and for geometric design output (including profiles, cross-sections, mass haul diagrams, etc.).		
3. Discuss flexibility for investigating alternate routes for the optimum road location.		

4. Review available information relevant to the area to be developed, including but not limited to: professional assessments, reconnaissance reports, air photos, agency comments and survey levels.		
5. Working with the road layout contractor, determine the responsibilities (as specified in the contract) for sign-off of all assessments (refer to *Project Tracking Sheet* in Appendix 1).		
6. For critical sites, carry out a site inspection before completing the design of the bridge or major culvert. For straightforward sites, the design can be based on the site plan details and the findings of others.	Bridge Designer	
Recommended Practices		
1. Make contractors aware that there may be inspections or check surveys during or after the project, and a performance review at the completion of the project to determine their suitability for future projects.		
2. Walk or fly critical sections of the area with the Layout Person, including major stream crossings, endhaul sections and disposal sites, heavy rock sections, major cuts and fills, and sections adjacent to sensitive resources.		

Works (layout of the road corridor)

Mandatory Requirements: Roads (Schedule A1)	**Responsibility**	**Reference**
1. Ensure that: • road layout accomplishes the objectives of higher level plans; • stream crossings protect bank and channel stability and minimize impact on aquatic resources; and • roads are located outside the riparian management area wherever practicable. If the road lies within a riparian management area, it requires District Manager approval, unless at a stream crossing. Any road location outside the originally approved route corridor requires amendment of the Forest Development Plan.		FRR 4
2. Incorporate the results of assessments into the road layout and design.		
3. Flag road centreline and tie it in by traverse to known control points.		
4. Complete a field reconnaissance report, including survey crew instructions.		
5. Complete a road layout and design schedule (e.g., Schedule A1 and A2) for those projects with no road location survey).		

6. Provide a construction cost estimate, where required, for consideration as part of any economic feasibility study.		
7. Field-check the centreline. The length of centreline checked will depend on the hazards involved and potential impacts to other forest resources.	District Specialist or district staff	
8. Provide the Regional Engineering Specialist with an opportunity to review critical corridors identified during the reconnaissance and field checks.	District Specialist	
9. Approve the centreline location.	District Specialist	
Mandatory Requirements: Survey and Design		
1. Ensure that drainage design provides for: • structurally sound bridges and culverts; • safe fish passage and protection of habitat of fish streams; and • maintenance of natural surface drainage patterns. Obtain biological input as required.		FRR 9
2. In terrain with moderate or high likelihood of landslide, ensure that a qualified registered professional: • provides road design measures, as well as an analysis identifying remedial actions and potential consequences of a landslide where the design measures contemplated will not result in the least likelihood of landslides; and • reviews the road layout and design, and signs off confirmation that his or her measures to maintain slope stability have been incorporated into the road layout and design (refer to *Project Tracking Sheet* in Appendix 1).		FRR 6, FRR 8
3. Initiate road clearance status check, allowing sufficient lead time.		
4. Request property services to acquire private property where appropriate. Prepare the Right-of-Way Acquisition Form, FS 959.		
5. Carry out a road location survey and geometric road design in areas of moderate to high likelihood of landslides, or where there is need to facilitate construction or minimize impacts on other forest resources.		FRR 6
6. Prepare a cost estimate at the completion of the design, or confirm development cost estimate.	Designer or District Specialist	

7. Monitor progress of the road layout and design. Monitoring frequency must take into consideration risks involved and scale of project. Monitoring must be constructive, with clear objectives and expectations stated. Encourage Layout Persons to do monitoring through frequent self-checks. Consider assigning the Regional Survey Technician to carry out this monitoring on a sampling basis.	District Specialist	
8. Sign off as the preparer of the road layout and design. If the design includes leaving or placing stumps, roots and embedded logs in the road prism, ensure the design is accompanied by a statement that this construction practice does not increase the risk of subgrade failure (refer to *Project Tracking Sheet* in Appendix 1).	District Manager or designate	FRR 6, FRR 8
9. If the road is bisecting a cutblock, ensure that the Silviculture Prescription properly considers the site disturbance that will be caused by the road.		
Recommended Practices: Survey and Design		
1. Carry out a road construction cost estimate such that: • for roads on flat to gentle side slopes, constructed totally in other material (OM) or negligible quantities of rock, use local lump sum average costs per kilometre for estimating the cost • for roads on moderate slopes, with some rock volumes, use lump sum averages for the OM portion, and average unit prices for the rock portion • for all other roads, use detailed cost estimating procedures, based on machine productivity and units of materials being excavated or placed	District specialist	
Mandatory Requirements: Bridges, Major Culverts and Other Structures		
1. Sign off a general arrangement drawing that illustrates the position of the bridge or major culvert structure along the road and over a stream, plus the horizontal and vertical controls, design high-water level and other appropriate details (refer to *Bridge and Major Culvert Design* in Appendix 2).	Designer	
2. For approaches to bridges, do not design turnouts in the riparian management area unless sight requirements or other safety considerations dictate otherwise.		
3. For complex structures or sites, consider having a preliminary design prepared for approval.	Regional Engineering Specialist	

4. Provide a sealed set of construction drawings for all bridges and major culverts, as well as for any other structures designed by a Professional Engineer (refer to *Project Tracking Sheet* in Appendix 1).	Designer	
5. Ensure that a cost estimate is prepared by the Designer or the Regional Engineering Specialist at the completion of the design.	District Specialist	
6. Through a review of previously completed cost estimates at the planning stage, reconfirm the economic feasibility of the project, including both road and structure costs.		
7. Review and recommend acceptance of the design of all engineered structures, other than cattleguards.	Regional Engineering Specialist	
8. Ensure that any cattleguards are obtained only from approved suppliers. The joint MOF, MOTH and MAFF standards and specifications document ison file in Victoria, each regional engineering office and with the Purchasing Commission (who also maintains a list of approved suppliers.	District Specialist	
9. Ensure that peer review is completed for complex in-house professional engineering designs.		
10. Refer road and structure designs to other agencies as required.	District Manager	FRR 3
Recommended Practices: Works		
N/A		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of the project (see *Management Quality Assurance* in Appendix 2).		
Recommended Practices		
N/A		

Chapter II Administration of Day Labour Projects

Planning and Pre-Work Review

Mandatory Requirements	**Responsibility**	**Reference**
1. Review the project to determine whether day labour is more appropriate than contract construction (refer to *Criteria for Day Labour* in Appendix 2). Confirm the rationale and ensure that the District Manager's approval has been obtained in writing for awards to suppliers estimated to cost more than $25,000 per project.		
2. Complete the engineering road layout and design for construction and modification works, and ensure that the District Manager (or his or her designate) has signed and accepted it.		
3. Complete the ministry cost estimate.		
4. Retain or appoint a Ministry Representative to direct the equipment on site.		
5. Select the appropriate equipment from the Victoria Engineering Equipment and Services (EES) system. Any deviations to this mandatory requirement must be justified and documented and equipment must be placed on EES before payment.		
6. Ensure that a piece of equipment will not amass more than 300 hours of work on a non-competitive direct award basis, for all works within the district for the year, or: • record in writing the District Manager (or his or her designate) approval for hourly hire projects that will require equipment use of more than 300 hours per unit, and • ensure that competitive rates are supplied for projects that will exceed 300 hours of individual equipment work.		
7. Use the Equipment Rental Rate Guide rates, unless a project will require approval for a piece of equipment to work more than 300 hours, as described in clause #6 above.		
8. Complete an Agreement Form, FS 21, once a year for suppliers in each district.		
9. Establish and implement a project safety plan, for which the ministry is responsible, consistent with WCB requirements (refer to *Safety/Evacuation Plan* in Appendix 2).		

Recommended Practices		
1. Meet with prospective equipment suppliers and operators at the beginning of the project or, preferably, before the start of the field season.		
2. Develop project work plans and scheduling as required to consider such matters as timing windows and other project constraints.		

Start-Up Meeting

Mandatory Requirements	**Responsibility**	**Reference**
1. Prior to the works, discuss the appropriate items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it in the project file.	Ministry Representative, contractor and his/her employees District Specialist	
Recommended Practices		
1. Where construction equipment is available for inspections, carry out spot checks for condition of the construction equipment, and adequacy of fire tools, spill kits and safety equipment.		

Works

Mandatory Requirements	**Responsibility**	**Reference**
1. Maintain a clear separation of duties between the Ministry Representative and the ministry spending authority. The Ministry Representative and the operator must both sign each time card daily, with both getting copies of the document.	Ministry Representative, operator	
2. Sign off the Contract Completion Certificate, FS 687, for road construction/ modification/deactivation projects over $25,000, and record any changes to the work that were made during the project.	District Specialist	
3. Evaluate the performance of individual operators and pieces of equipment, to either confirm their acceptability for future contract work or remove them from consideration for future work. Forward to Victoria any recommendations for removing equipment or a contractor from the provincial list.	Ministry Representative District Specialist	
4. Identify on the final daily time card payment for mobilization and demobilization as a separate cost item , and pay it in accordance with the Engineering Equipment Hire Agreement, FS 21.		

Recommended Practices		
1. Run time studies of equipment to confirm or improve local cost estimating procedures.	Ministry Representative	
2. Request activity/cost reports on a pre-determined basis.		
3. Ensure a copy of financial project data (including progress reports on productivity and costs) is filed in the road project file.		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of financial practices for the project, including conformance to the *Financial Administration Act* and government and ministry policies and procedures.		
Recommended Practices		
1. Review equipment selection practices, taking into consideration the provincial list and rotation of work among qualified contractors.		

Chapter III Administration of Construction/Modification Contracts

Planning and Pre-Work Review

Mandatory Requirements	**Responsibility**	**Reference**
1. Review the project requirements to ensure conformance with the Ministry of Forests' *Contract Administration Manual*.		
2. Complete the ministry cost estimate, based on the approved road layout and design.		
3. Publicly tender any works contracts, unless the District Manager approves otherwise. It may, however, be appropriate to direct-award small jobs, particularly to evaluate new local contractors.		
4. Retain or appoint a Ministry Representative to inspect the contract works.		
5. Select an appropriate tendering period. This may be influenced by the complexity of the project, the need for a mandatory site visit to be made during the tendering period, fish timing windows or snow free periods.		
6. Advertise the contract in the appropriate locations (refer to *Advertising* in Appendix 2). For information about the ministry's Internet Contract Advertising System (ICAS), go to http://www.for.gov.bc.ca/isb/forms/lib/ICAS-Guide.doc.		
7. As applicable, prepare, award and sign off a contract with the lowest qualified bidder for the works (assuming the ministry budget can accommodate that price compared to the ministry estimate; refer to *Works Contract Documents* in Appendix 2).		
Recommended Practices		
1. Consider taking prospective bidders on a site visit.		

Start-Up Meeting

Mandatory Requirements	**Responsibility**	**Reference**
1. Prior to the works, discuss all items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it in the project file.	Ministry Representative, contractor and his/her employees District Specialist	
2. Carry out equipment spot checks for condition and adequacy of fire tools, spill kits and safety equipment.		

Recommended Practices		
1. Establish an inspection protocol (including timing) for measuring adherence to schedule.		
2. Review procedures around change of work, change of conditions, etc.		

Works

Mandatory Requirements	**Responsibility**	**Reference**
1. Establish an inspection plan to review the delivery and quality of the works and to oversee the work of the Ministry Representative.	District Specialist	
2. Maintain a comprehensive project diary/journal, and place this document on the project file at the completion of the works.	Ministry Representative	
3. Put all instructions to the contractor in writing.		
4. Record any modifications made to the approved road layout and design as a result of unforeseen site conditions (refer to *Modification of Prescriptions and Designs* in Appendix 2).		
5. Act as the receiving authority for any contract invoices.	Ministry Representative	
6. Sign off the Contract Completion Certificate, FS 687, for road construction/ modification/deactivation projects and record any changes to the work that were made during the project.	District Specialist	
7. Evaluate and record the performance of the service and works contractors, to either accept or reject them for future work. Advise those who are rejected for future work.		
Recommended Practices		
1. Advise contractors of the results of any performance evaluation.		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of the administration of the contract.		
Recommended Practices		
N/A		

Chapter IV Road and Drainage Construction

Planning and Pre-Work Review

Mandatory Requirements	**Responsibility**	**Reference**
1. Ensure that the road layout and design has been signed off as "accepted," with appropriate components signed and sealed by qualified registered professionals (refer to *Project Tracking Sheet* in Appendix 1).		
2. Ensure that Exhibit A status is complete and checked for conflicts.		
3. Field check that: • the road centreline is marked and referenced; • riparian management area boundaries are marked if potential conflicts exist; and • private property boundaries are marked, if applicable (if they're in doubt, a legal survey may be required).		
4. Check to see if changes have occurred to the physical condition of streams and hillslopes in and about the project that would require modifications of the plans and designs. If changes have occurred, make modifications, obtain approvals and amend the work plan.		
5. Confirm the source and suitability of rip rap and bridge end fill material, other borrow requirements, and the suitability of waste sites.		
6. Ensure that access to the site for mobilizing equipment and oversized, prefabricated materials is secured through co-ordination of contractors, safe bridge ratings, use of gate keys, and maintenance of suitable road conditions (with attention paid to subgrade durability, snow levels and washouts).		
7. Confirm work windows acceptable to MELP and DFO and summarize requirements for all other agencies. Obtain approval from both agencies for in-stream work outside the acceptable windows for operation.		
8. If the project is a day labour project, ensure that the Ministry Representative has the necessary expertise to develop and implement: • signage needs (refer to *Signage* in Appendix 2); • a safety/evacuation plan (refer to *Safety/Evacuation Plan* in Appendix 2); • a spill plan (see *Spill Plan* in Appendix 2); and • a sediment control plan (refer to *Sediment Control Tools* in Appendix 2).		

9. Notify stakeholders as required (refer to *Notification of Stakeholders* in Appendix 2).		
10. Prepare a package of construction documents, including plans, profiles, cross sections, maps, specifications, to be discussed at the Start-Up Meeting.		
11. Prepare, award and sign off applicable contract documents (hourly, Major Works, etc.) for construction (refer to *Works Contract Documents* in Appendix 2).		
Recommended Practices		
1. When possible, have available the complete approved drawings for the road, together with those for any bridge or major culvert, to ensure the designs are compatible.		
2. Mark clearing boundaries on slopes >30%.		

Start-Up Meeting

Mandatory Requirements	**Responsibility**	**Reference**
1. Prior to the works, discuss all items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it in the project file.	Ministry Representative, contractor and his/her employees District Specialist	
2. Confirm any requirement for the Regional Engineering Specialist to advise the person responsible for off-loading the ministry-supplied materials of any specialized lifting, rigging and storage requirements, where the fabricator has not provided the information or the information is not otherwise apparent.	District Specialist	
3. If applicable, confirm the contractor's responsibility for marking merchantable right-of-way timber.		
Recommended Practices		
N/A		

Works

Mandatory Requirements	Responsibility	Reference
1. During site preparation, ensure that riparian values are protected and right-of-way timber is removed without damage to streams, lakes and wetlands. Danger trees must be felled in accordance with WCB regulations.		FRR 11
2. Deal with stumps, roots, and embedded logs according to the road layout and design requirements. This includes ensuring the proper management of stumps, roots, embedded logs and topsoil during tote road construction. NOTE: Deactivation obligations must be tracked, preferably in an electronic database.		FRR 11
3. Dispose of slash and debris according to the road design requirements (through scattering, piling and burning, burying and endhauling). Dispose of soils that are incapable of supporting the road and applied vehicle loads, as well as slash and debris, without negatively affecting fish habitat, water quality and slope stability.		FRR 11
4. To ensure tote road stability, employ the same or similar construction techniques as in grade construction (i.e., installing stream culverts, creating stable fillslope angles, treating slash and debris, and following limits on sidecasting.		
5. Shut down any works if there is sufficient risk to safety or to environmental or archaeological resources or other forest resources (refer to *Shutdown Criteria and Procedures* in Appendix 2).		
6. Complete construction surveys for roads designed and constructed in terrain with moderate or high likelihood of landslides. Do this concurrently with road construction or after removal of right-of-way timber.		FRR 12
7. Make any modifications to the road layout and design for unforeseen site conditions and re-mark the limits of slope construction in terrain with moderate or high likelihood of landslides (refer to *Modification of Prescriptions and Design* in Appendix 2).		FRR 12
8. For single season winter roads, minimize earth component in the fill.		
9. Minimize flyrock by ensuring that proper blasting techniques are used.		FRR 12
10. Prior to blasting, inform affected local stakeholders (refer to *Notification of Stakeholders* in Appendix 2).		
11. To minimize sedimentation, slope instability and the reduction of water quality, build drainage systems (temporary or permanent) concurrently with subgrade construction.		FRR 12

12. Limit machine activities in the riparian management area to those approved in conjunction with the road layout and design. This includes limiting stream crossings by machines to one location within the clearing width.		FRR 12
13. Protect fish habitat and the stability of channels and stream banks during the falling, processing, decking and loading of right-of-way timber.		FRR 11
14. Place and maintain rip rap or other suitable erosion protection at drainage structures and along fills in the flood plain.		FRR 12
15. Locate, construct and stabilize pits, quarries and disposal sites so that water runoff is managed to prevent transportation of sediment to streams.		FRR 12
16. Do not remove gravel or fill from a riparian management area without approval.		FRR 12
17. Do not service or refuel equipment in a riparian management area.		FRR 12
18. Do not build turnouts in a riparian management area unless approved in the road layout and design.		
19. Ensure that all permanent and seasonal streams are crossed by appropriate drainage structures. Construct either temporary or permanent bridges, culverts or fords concurrent with subgrade construction. Maintain natural drainage patterns.		FRR 13, FRR 12
20. Ensure that bridges, culverts and fords (including their approaches) are erosion-resistant, functional, stable and structurally sound, and that their inlets and outlets are unobstructed. As well, prevent channel destabilization and ensure that settling ponds and other sediment control devices minimize downstream sediment transport (refer to *Sediment Control Tools* in Appendix 2).		FRR 13
21. Carry out works in fish streams during time periods and with measures specified by the Designated Environment Official to provide safe fish passage and protection of fish habitat.		FRR 13
22. Stop or modify work to avoid damage to a previously unidentified fisheries-sensitive zone.		FRR 12
23. Install drainage works to collect all cutslope flows and drain ditches, so as to prevent hazardous ponding and outflow onto sensitive slopes while minimizing sediment transport.		FRR 13
24. Install ditch blocks at the appropriate locations and below the grade level.		FRR 13
25. Line all gravel deck log stringer bridges and log culverts with non-woven geotextile.		FRR 13

26. Place road surface material in such a way as to minimize sediment transport into streams, and so that the road subgrade can carry design wheel loads.		FRR 14
27. Revegetate soils in accordance with approved specifications.		FRR 15
28. In community watersheds: • do not use known acid-generating rock as fill or rip rap; • ensure that drainage works meet the known water quality objectives; and • notify the water licensees and a Designated Environment Official 48 hours before the start of the works.		FRR 12
29. Ensure that all bridge and major culvert materials are fabricated to CSA standards.		FRR 13
30. Ensure that a Professional Engineer signs and seals a statement in a timely manner that bridges, major culverts and other engineered structures are in conformance with the drawings and specifications, using FS 138 (refer to *Project Tracking Sheet* in Appendix 1).		FRR 13
31. Ensure, for all roads where the design measures to maintain slope stability and/or water quality have been prepared by a qualified registered professional, that a qualified registered professional prepares a statement attesting to the construction having been carried out in general conformance with the approved road layout and design (refer to *Project Tracking Sheet* in Appendix 1).		FRR 12
32. For all bridges and major culverts, forward to the Regional Engineering Specialist all on-site records, as well as material certificates, tests, records and field and construction details, including the preparation of as-built drawings, signed by the designer. Enter all the above information in the Regional Bridge Register and retain it for the life of the structure plus one year.	Regional Engineering Specialist	FRR 13
33. For all other structures designed by a Professional Engineer, retain all on-site records in the appropriate district road file for the life of the structure plus one year.		
34. Install information and traffic control signs prior to road use (refer to *Signage* in Appendix 2).		

Recommended Practices		
1. Ensure that a qualified inspector inspects the road and drainage structures after the first spring runoff or the first major storm event following installation.		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of the project (see *Management Quality Assurance* in Appendix 2).		
Recommended Practices		
N/A		

Chapter V Road and Bridge Maintenance

Planning and Pre-Work Review

Mandatory Requirements: Roads	**Responsibility**	**Reference**
1. Ensure that roads are identified on a current Forest Development Plan.		
2. Prepare a road inspection plan.		FRR 18
3. Carry out detailed inspections of roads based on the inspection plan and advise the District Manager of any critical environmental, safety or other issues (a suggested tool is the Road Inspection/Completion of Remedial Maintenance Works Form at the end of this SOP).		
4. Record inspections in appropriate databases.		
5. Prepare a risk ranking for each of the roads under consideration, based on hazards and potential consequences of failure.		
6. Prepare project cost estimates.		
7. Prepare a district road maintenance plan based on inspection information, the risk ranking process, the estimated costs and an appropriate allocation of funds.		
8. Prepare a road closure plan for those roads that cannot be funded but which pose a risk to users.		
9. Advise the District Manager of the ramifications of not funding specific roads (e.g., describing the effects of road closures, the potential impacts on other resources, and the possible deterioration of the structural integrity of the road itself).		
10. Inform the public, where appropriate, about the general condition of roads, road closures and other decisions related to lack of funding for maintenance (refer to *Notification of Stakeholders* in Appendix 2)		
11. As applicable, prepare, award and sign off appropriate contract documents for maintenance work (refer to *Works Contract Documents* in Appendix 2).		
12. Use ministry staff or retain a contractor as the Ministry Representative to direct equipment and otherwise administer field operation.		
13. Prepare safety/evacuation and spill plans (refer to *Safety/Evacuation Plan* and *Spill Plan* in Appendix 2).		

Mandatory Requirements (Bridges)		
1. Prepare a bridge and major culvert inspection plan based on the Regional Bridge Register, recent occurrence of major flood events, detection of structural defects and chronic repair problems.	Regional Engineering Specialist, in co-operation with district engineering staff	FRR 16
2. Confirm the qualifications of "qualified inspectors."	District Specialist, in consultation with the Regional Engineering Specialist	
3. If the qualified inspector is a contractor, prepare a contract (refer to *Works Contract Documents* in Appendix 2).		
4. Ensure that the qualified inspector carries out detailed inspections of bridges and major structures based on the bridge and major culverts inspection plan. Use the appropriate bridge inspection forms, as specified by the Regional Engineering Specialist.		
5. Direct the qualified inspector to produce inspection reports.		FRR 16
6. Review results of inspections, evaluate load ratings and record results in appropriate databases	Regional Engineering Specialist	
7. Prepare a cost estimate for repair and maintenance items for each structure.	District Specialist, in consultation with the Regional Engineering Specialist	
8. Ensure that bridges that may have structural deficiencies are evaluated by a Professional Engineer.		FRR 17
9. Consider recommending load restrictions or the replacement or closure of a structure where appropriate.	Regional Engineering Specialist	
10. Prepare a bridge maintenance plan, and advise the District Manager of the ramifications and risk of not funding specific maintenance activities (e.g., describing the effects of road/bridge closures, the potential impacts on road users and other resources, and the possible deterioration of the asset).	District Specialist, in consultation with the Regional Engineering Specialist	
11. Inform the public, where appropriate, about maintenance to be carried out (road closures) and restrict traffic loads to a safe level. As well, post signs (refer to *Signage* in the Appendix 2).		

12. As applicable, prepare, award and sign off appropriate contract documents for maintenance work (refer to *Works Contract Documents* in Appendix 2).		
13. Prepare a works monitoring schedule, incorporating required professional engineering inspections.		
Recommended Practices (Roads)		
1. Ensure that a qualified inspector inspects the road and drainage structures after all major storm events.		
2. Investigate maintenance issues reported by outside individuals and agencies.		
3. List chronic maintenance issues.		
4. Review previous inspection reports, and plan to address issues that have surfaced before or were not addressed previously.		
5. Review an incident map or tracking system if available.		
Recommended Practices (Bridges)		
1. Document and file all on-site inspections by agencies and others, including the public.	Regional Engineering Specialist	
2. Review previous inspection reports and repair/maintenance work, and plan to address issues that have surfaced before or were not addressed successfully in previous work.		
3. Consider using the following criteria for choosing "qualified inspectors." *Technicians may carry out visual and routine condition inspections and physical (non-destructive) testing of log stringer and other log and timber elements, and general visual examinations of steel-and-concrete components, if they:* • have worked at least 5 years in bridge inspection, bridge construction and bridge maintenance (with emphasis on routine bridge condition inspection); and • have successfully carried out independent bridge inspections, as well as inspections under the direct supervision of a qualified registered professional.	District Manager, in consultation with the District Specialist and the Regional Engineering Specialist	

Review the qualifications of the qualified inspector, giving consideration to individuals with technical or academic training in relevant fields and affiliated with organizations that are directly associated with bridge inspection (e.g., AASHTO certification, Ministry of Transportation and Highways certification). Note that Professional Engineers are responsible for carrying out detailed, close-proximity bridge structure inspections, and for testing steel-and-concrete and glulam and other complex bridge structures.		

Start-Up Meeting

Mandatory Requirements: Roads and Bridges	**Responsibility**	**Reference**
1. Prior to the works, discuss all items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it on the project file.	Ministry Representative, contractor and his/her employees District Specialist	
2. Prepare a road inspection plan.		
Recommended Practices: Roads and Bridges		
1. Where equipment is available for inspections, carry out spot checks for condition and adequacy of fire tools, spill kits and safety equipment.		
2. Check that the contractor knows and understands the requirements of the work.		
3. Brief the contractors and/or project supervisors and safety personnel on safety, first aid and traffic control issues.		
4. Inform the Ministry Representative of project reporting requirements and outputs.		

Works

Mandatory Requirements: Roads	**Responsibility**	**Reference**
1. Carry out maintenance/remedial works according to maintenance plans and prescriptions (a suggested tool is the Road Inspection/Completion of Remedial Maintenance Works Form at the end of this SOP).		FPC 63
2. Repair deficiencies within specified time frames.		FRR 18
3. Document work progress.		

Mandatory Requirements: Bridges		
1. Carry out repair and maintenance work in general conformance with bridge maintenance plans.		
2. Document work progress.		
3. Carry out scheduled inspections of works, including professional engineering inspections. Complete professional certification where required.		
4. Document all completed repair and maintenance work in appropriate database files.		
Recommended Practices: Roads		
1. Finish phases before moving on to other work.		
2. Document and file all on-site inspections by agencies and others, including the public.		
Recommended Practices: Bridges		
1. Document works and work progress with photographs and/or video.		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of the project (see *Management Quality Assurance* in Appendix 2).		
Recommended Practices		
.A.		

Road Inspection/Completion of Remedial Maintenance Works Form

Date: Y M D	*File No*	*Road Name*	*Road Project Number*
Forest Region	*Forest District*	*Local Road Name*	*Local Road Number*

Licensee or Agency	*Forest Licence or TSL*	*Road Permit or CP Number*	*Amendment No. or Block No.*	*Road Section No.*

GPS Co-ordinates Start of Inspection: *Weather:*

Location (Km) or GPS Co-ordinate	Problems Noted (Code)	Recommended Remedial Actions			Urgency Rating VH= within 1 week H = within 30 days M = within current field season L = reassess situation next inspection	Remedial Work Completed Date/Initial (to be completed where no electronic tracking is available)
		Code	Code	Comments		

Miscellaneous Inspection Comments:

Comments Regarding Remedial Actions:

Sign-off of Inspection:

Inspector	Y	M	D	*Licensee or Agency Specialist*	Y	M	D

Sign-off of Completion of Remedial Maintenance Works:

Inspector	Y	M	D	*Licensee or Agency Specialist*	Y	M	D

ROAD INSPECTION/MAINTENANCE FORM

INSPECTION CODES

(To be used in conjunction with the Form under Problems Noted)

Inspect for the following items: (Inspection is not limited to these items)			
• Tension cracks visible	SI-01	• Natural drainage patterns	DS-01
• Cutslope failures	SI-02	• Culverts partially or fully plugged	DS-02
• Fillslope failures	SI-02	• Culverts washed out	DS-03
• Slides or mass land movements	SI-04	• Damaged culverts	DS-04
• Shoulder slumps	SI-05	• Culvert markers	DS-05
• Frost boils	SI-06	• Fill over culverts	DS-06
• Subgrade unable to support wheel loads	SI-07	• Ditch blocks	DS-07
• Washouts	SI-08	• Cross-drain culvert frequency	DS-08
		• Cross-drain or stream culvert sizes	DS-09
• Depth of surface material	RS-01	• Ditch scour	DS-10
• Potholes	RS-02	• Ditches obstructed	DS-11
• Washboard	RS-03	• Ditch line sloughing	DS-12
• Rutting from vehicle wheels	RS-04		
• Windrows	RS-05	• Fish stream culvert inlets and outlets	FP-01
• Surface stabilization	RS-06	• Inadequate structure	PF-02
• Damage from cattle	RS-07		
• Road surface erosion	RS-08	• Site distances	SA-01
• Sediment transport from road prism	RS-09	• Brushing	SA-02
• Dust control	RS-10	• Snags and danger trees	SA-03
		• Other road hazards (loose rocks, stumps, etc.)	SA-04
		• Traffic control signs	SA-04
		• Road radio frequencies posted	SA-06

REMEDIAL CODES

(To be used in conjunction with the Form under Recommended Remedial Action)

Carry out the following remedial works: (Remedial works are not limited to these items)	
Correct to specification	CA
Certify structures	CB
Rectify hazards	CD
Install or repair cross-ditches	DA
Install or repair	DB
Remove cross-drains/stream culverts	DD
Clean or repair cross-drains/stream culverts	DE
Back up cross-drains/stream culverts	DF
Repair/replace bridges	DH
Outslope road	DJ
Install/repair sediment basins	DM
Revegetate	DN
Licensee inspections required as per Plan	MA
Carry out brushing	MB
Clean ditches	MD
Clean culvert inlets and outlets	ME
Grade surface	MF
Stabilize subgrade	MG
Replace planks, delineators, etc.	MH
Replace or repair cattleguard	MI
Replace signs	MJ
No action	NAC

Chapter VI Deactivation Prescriptions

Planning and Pre-Work Review

Mandatory Requirements	**Responsibility**	**Reference**
1. Ensure that the level of deactivation and level of access are consistent with current approved Forest Development Plan.		FPC 64
2. Identify any assessments that are required, and pre-determine the qualifications of the person who will prepare the assessments.		FRR 4
3. Identify any 5-year roads that may require removal of stumps, roots and embedded logs.		FRR 11
4. For temporary deactivation, particularly if the work is to be done by a licensee in the Small Business Forest Enterprise Program, identify whether a prescription is required by the District Manager.		FPC 64
5. Review the watershed beyond and adjacent to the works to ensure that future roadway or hillslope works will not be isolated by deactivating front-end roads.		
6. Establish requirements for terrain stability and riparian assessments where these have not been carried out previously, or where site conditions warrant. NOTE: Co-ordinate deactivation with other land base treatments such as landslide rehabilitation or stream enhancement under Forest Renewal BC.		FRR 4
7. If it is determined that the Forest Development Plan will require amending as a result of changes to access or level of deactivation (e.g., if known silviculture, wood salvage or forest industry access needs have changed), ensure that the plan is reviewed, amended and signed off.		
8. Ensure that the qualifications of the person preparing the deactivation prescription are appropriate.		
9. Where applicable, prepare, award and sign off the prescription and assessment contracts (refer to *Works Contract Documents* in Appendix 2).		
Recommended Practices		
1. Where the person preparing the deactivation prescription is a non-professional, instruct him or her to make recommendations as to when site-specific professional prescriptions are required.		

Start-Up Meeting

Mandatory Requirements	**Responsibility**	**Reference**
1 Prior to the works, discuss all items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it in the project file.	Ministry Representative, contractor and contractor's employees District Specialist	
2. Review and sign off requirements for assessments and prescriptions (refer to *Project Tracking Sheet* in Appendix 1).		
Recommended Practices		
N/A		

Works

Mandatory Requirements	**Responsibility**	**Reference**
1. Ensure that terrain stability field assessments are carried out as required. A qualified registered professional must: compile such an assessment in areas having a moderate to high likelihood of landslides; and prepare deactivation prescriptions for work in these areas.		FRR 4 FRR 20
2. Carry out a riparian assessment, where required, adjacent to the road.		FRR 4
3. Provide specifications to: • minimize soil erosion and sediment transport; • allow for approved access; • establish proper deactivation level; • maintain water quality; • maintain fish passage and habitat; and • conform to timing windows and measures.		FRR 20
4. Provide a rationale for each situation where a permanent deactivation prescription calls for: • removal of bridge and log culvert substructures, as well as superstructures; and • pipe culverts to be left at stream crossings.		FRR 25

5. Identify imbedded stumps and logs for removal where stability is a concern.		FRR 11
6. Analyse the potential consequences of a deactivation prescription [?] to downslope resources, utilities and properties. Incorporate an adequate level of protection in the prescriptions to protect the affected resources.		
7. Where a professional deactivation prescription is required, ensure that the person preparing the prescription identifies the requirement (or not) for professional review and sign-off at the completion of the deactivation works.		FRR 20
8. Compile a cost estimate for the prescribed works both as a component of the prescription contract and as if it were to be conducted by ministry staff.		
9. Sign off the prescription (refer to *Project Tracking Sheet* in Appendix 1).	District Manager	FPC 64
10. Monitor the progress of the works, using a monitoring frequency that takes into consideration the risks involved and scale of project.		
11. Compare the cost estimate for the deactivation works to maintenance costs to confirm that deactivation is cost-effective.		
12. Have ministry professionals review prescriptions where technical staff question the output of professional consultants.		
13. When appropriate, consult with other agencies.		
Recommended Practices		
1. Where feasible, have the same professional carry out the terrain assessments and prescription concurrently, to achieve efficiency and quality of output.		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of the project (see *Management Quality Assurance* in Appendix 2).		
Recommended Practices		
N/A		

Chapter VII Deactivation Works

Planning and Pre-Work Review

Mandatory Requirements	Responsibility	Reference
1. Ensure that deactivation prescriptions are consistent with the current Forest Development Plans and have been prepared and approved by the District Manager (or his or her designate), with appropriate sections signed and sealed by qualified registered professionals.		FPC 64
2. Where long-term notification is required, notify stakeholders appropriately (refer to *Notification of Stakeholders* in Appendix 2).		
3. Field-check the following: • location markers; • prescription details for critical road sections; • disposal sites; • any changes that have occurred to the physical conditions of streams and hillslopes in and about the project that would require modifications of the prescriptions.		
4. If changes to streams and hillslopes have occurred, make modifications to the deactivation prescription, obtain approvals and amend the work plan.		
5. Ensure that access to the site is secured through safe bridge ratings, use of gate keys and maintenance of road conditions suitable for mobilizing equipment (with attention paid to subgrade durability, snow levels and washouts).		
6. Confirm timing windows and measures for work in and about streams.		
7. Ensure that there is a safety/evacuation plan (refer to *Safety/Evacuation Plan* in Appendix 2).		
8. Ensure that there is a spill plan (refer to *Spill Plan* in Appendix 2).		
9. Ensure that a sediment control plan is completed where the risks to other forest resources justify it, and ensure it is incorporated as a contractual requirement.		
10. Prepare, award and sign off appropriate contract documents for deactivation works (refer to *Works Contract Documents* in Appendix 2).		
11. Prepare a deactivation package (showing amendments from the original prescription, if required) to be discussed at the Start-Up Meeting (see below).		

Recommended Practices		
1. Consider the use of specialized equipment when operating in sensitive sites.		
2. Summarize information signage needs and initiate action as required (refer to *Signage* in Appendix 2).		

Start-Up Meeting

Mandatory Requirements	**Responsibility**	**Reference**
1. Prior to the works, discuss all items on the *Start-Up Meeting Checklist* (see Appendix 1). Initial the checklist and place it in the project file.	Ministry Representative, contractor and his/her employees District Specialist	
2. Ensure that notification of stakeholders has been carried out.		
Recommended Practices		
N/A		

Works

Mandatory Requirements	**Responsibility**	**Reference**
1. Prior to the start of works, erect one or more signs, alerting users that the road is closed and warning them of hazards.		FRR 22
2. Ensure that any modification of a prescription in an area of moderate to high hazard terrain is approved by a qualified registered professional. Note that modification may occur without the approval of the District Manager where the change will not adversely impact resources (refer to *Modification of Prescriptions and Designs* in Appendix 2).		FRR 21
3. Do not service or refuel equipment in the riparian management area.		
4. Carry out works on or adjacent to fish streams in accordance with timing windows and measures specified by the Designated Environment Official to provide safe fish passage and protect fish habitat.		FRR 13
5. Deactivate pits, quarries and disposal sites so that water runoff is managed to prevent transportation of sediment to streams.		
6. Ensure that revegetation works are consistent with specifications in the prescription.		FRR 15

7. Shut down any works if there is sufficient risk to safety or to environmental or forest resources (refer to *Shutdown Criteria and Procedures* in Appendix 2).		
8. Ensure that the works are in general conformance with the approved prescription. Where specified in a prescription, a qualified registered professional must sign and seal a statement that the works are in general conformance with the prescriptions (refer to *Project Tracking Sheet* in Appendix 1).		FPC 64 FRR 20
9. Inspect the works, using an inspection frequency that takes into consideration the risks involved and scale of project.		
Recommended Practices		
1. Complete any professional sign-off requirements within 30 days (refer to *Project Tracking Sheet* in Appendix 1).		
2. Inspect the deactivation works after spring runoff and major storm events.		

Management Role in Quality Assurance

Management review of the engineering program functions is mandatory at a sampling level determined by the District Manager. It is the District Manager's decision as to which projects will be sampled.

Mandatory Requirements	**Responsibility**	**Reference**
1. Conduct a management review of the project (see *Management Quality Assurance* in Appendix 2).		
Recommended Practices		
N/A		

Chapter VIII Administration of Forest Service Road Maintenance

Purpose

The purpose of this Standard Operating Procedure (SOP) is to provide direction to districts and the BC Timber Sales (see Schedule A) on categorizing and applying forest service road maintenance standards, and on spending of ministry funding on forest service road maintenance. The SOP is intended to reflect the results of the ministry's core review, be subject to the Ministry Policy 8.25 Standard Operating Procedures for Forest Service Roads (http://www.for.gov.bc.ca/tasb/manuals/policy/resmngmt/rm8-25.htm) and be consistent with Chapter 5 (Road and Bridge Maintenance) of these Standard Operating Procedures.

Mandatory Requirements

1. Establish the category of road maintenance required for each forest service road or road section based on the following category descriptions:

   (a) ***"Industrial use FSRs"*** are those FSRs that are used for at least part of a year by an industrial user (defined as transportation of natural resources) under a Road Use Permit.

   (b) ***"Public use FSRs"*** are those FSRs that access year-round communities, defined as:

   - populated Indian Reserves, or
   - population centres that have a post office, or either have a school or are served by school buses provided by the school district.

   They do not include roads that provide access to isolated residences or cabins, commercial operations, parks or recreation sites.

   (c) ***"Wilderness FSRs"*** are those FSRs that, on either a part time or full time basis, are not used to accommodate communities or school bus routes nor utilized by any industrial users under Road Use Permit. The primary objective for maintaining such roads is to provide environmental maintenance while allowing access for motor vehicles. No surface maintenance is provided, and the types of vehicles may be limited due to the condition of the road surface; this access is not guaranteed, and may be lost where slope failures and other structural failures may preclude vehicle access.

   (d) ***"Closed FSRs"*** are those FSRs that are barricaded to temporarily preclude vehicle access during times of unacceptable hazards to user safety, until either appropriate repairs are made in accordance with the service plan, or until the road is permanently deactivated. Note that such roads may already be closed for other reasons, including threat of damage to the road during breakup, for example. If access to private property is required, Property Services should be contacted prior to closing the road for advice on government liability due to the closure; based on that advice, consider whether it might be more prudent to fix the problem and keep the road open.

2. For *industrial use* FSRs (including sections of FSRs):

   (a) rescind those existing road use permits that contain details of responsibilities for maintenance, and replace them with the current provincial model;

(b) provide a letter to a road use permit holder that the district manager is delegating maintenance responsibilities to that permit holder under Section 63(7) of the Act, but the district or BC Timber Sales will retain the responsibility for carrying out and funding the following operations:

- 2 or 3 year inspections of bridges and major culverts as per section 16 of the FRR – inspection reports shall be provided to the road use permit holder to allow the permit holder to carry out required repairs. Note that the permit holder is responsible for all other inspections that might be required on these bridges or culverts
- snow ploughing of all or portions of a FSR that is also a public use FSR where the road use permit holder is not carrying out winter operations that would require the holder to plough the road

(c) where a licensee requests cancellation of a Road Use Permit over a road or road section, cancel the permit only where the licensee's approved forest development plan for the next year demonstrates that, for that year, the licensee will not use the road or road section for industrial purposes as defined in Section 54(1) of the Act.

3. For *public use* FSRs (including sections of FSRs):

(a) provide surface and structural maintenance (other than bridge replacements) in accordance with the pertinent service plan to a standard commensurate with the existing standard of maintenance and with the number and type of vehicles in use in the community; do not upgrade the road unless the risk to user safety otherwise is or will become unacceptably high.

(b) consider MOF funding to be incremental funding to any funding currently provided by MOT or other agencies or sources, and only to be used where necessary to address the standard of maintenance described in (a) above, beyond what the other funding is able to address.

(c) carry out snow ploughing of all or portions of the road where the road use permit holder is not carrying out winter operations that would require the holder to plough the road

(d) carry out work to mitigate environmental problems on a project basis in accordance with section 18(1)(b),(c) and (d) of the Forest Road Regulation and with the ranking in the service plan

(e) document the need for bridge replacements in the form of an issue paper to the regional manager.

4. For *wilderness* FSRs (including sections of FSRs):

(a) determine, in accordance with Schedule A, those roads for which BC Timber Sales shall be responsible for maintenance;

(b) rank environmental projects for expenditure according to the service plan.

(c) provide environmental project maintenance in accordance with section 18(1)(b),(c) and (d) of the Forest Road Regulation; carry out slope and other structural repairs that would restore access only if access can be achieved concurrently with and at no additional cost to providing environmental protection, or if access is required for other environmental projects further up the road.

(d) for bridges and bridge decks, carry out repairs only; document the need for bridge and bridge deck replacements in the form of an issue paper from the district manager to the regional manager, or from BC Timber Sales to the Director, Forest Enterprise Branch.

(e) where appropriate, communicate to road users the changes to FSR maintenance.

5. For *closed* FSRs (including sections of FSRs):

   (a) determine, in accordance with Schedule A, those roads for which BC Timber Sales shall be responsible for closing;

   (b) place a road closed sign at the beginning of the road, and install a physical barrier to keep vehicles off the road; such barriers might include gates, berms, lock blocks, tank traps, etc. This work is to be considered a high priority within the maintenance funding and will be carried out at the expense of moderate or low ranked projects.

   (c) district manager to provide early warning notices to the regional manager, or BC Timber Sales to the Director, Forest Enterprise Branch, for possible contentious situations

   (d) inspect the road annually or commensurate with the length of the closure and, depending on existing resources, following the occurrence of extreme storms and flood events

   (e) prepare a local communications plan, and implement the plan to advise stakeholders and the public of the closure and the existence of any available alternate access.

Schedule A -
BC Timber Sales Responsibilities for Forest Service Roads

BC TIMBER SALES RESPONSIBILITY FOR FSR MAINTENANCE:

Except where an industrial user has been delegated responsibility for maintenance by the district manager, and therefore the district manager's staff will monitor for Code compliance, BC Timber Sales will be responsible for ensuring that maintenance is carried out on those FSRs:

- that BC Timber Sales (or SBFEP) has constructed since the inception of the small business program.
- that BC Timber Sales has not constructed, but where BC Timber Sales operations are or will be exclusively carried out

Note: small scale salvage operations are not considered to be representative of operations that alone would generate future maintenance responsibilities for the BC Timber Sales. Rather, these salvage operations are not tied to one program, but "piggy-back" on any regular harvesting operations.

ADMINISTRATION OF ROAD USE AND ROAD PERMITS ON BC TIMBER SALES FSRS:

To maintain the status quo both operationally and according to statute, and refrain from resourcing duplicate administrative operations,

- BC Timber Sales will review all permit applications by their licensees, and request permit issuance or exemption from permits from the district manager
- All permits or exemptions will be issued by the district manager in accordance with the Act once a request has come from BC Timber Sales
- The district manager will issue delegation of maintenance letters to those BC Timber Sales licensees who have a road use permit and will carry out the road maintenance on behalf of the Crown
- The district manager will continue to monitor permit activities for Code compliance

CONSTRUCTION, MODIFICATION AND DEACTIVATION OF FSRS:

- BC Timber Sales will prepare road layouts and design for construction or modification of FSRs, and prescriptions for their deactivation, and submit them for approval to the district manager.

FOREST DEVELOPMENT PLANS:

BC Timber Sales will continue to prepare FDPs that, in addition to covering off harvesting areas, show the roads for which they are responsible for constructing, maintaining and deactivating.

APPENDIX 1: Project File Records

Start-Up Meeting Checklist

Prior to the works beginning, the Ministry Representative, the contractor and his or her employees must discuss the following items:

	Check one box	
	Yes	N/A
• Authorities and responsibilities of Ministry of Forests staff and Ministry Representative		
• Work schedule and the ministry's expectations for performance		
• Known hazards (e.g., reduced bridge load ratings, overhead power line clearance)		
• Safety/evacuation plan (refer to *Safety/Evacuation Plan* in Appendix 2)		
• Spill plan procedures and kits (refer to *Spill Plan* in Appendix 2)		
• Project shutdown criteria (refer to *Shutdown Criteria and Procedures* in Appendix 2)		
• Sediment control measures		
• Fire tools and equipment		
• Details of the work and related information [arrange to walk/fly/drive critical components of the job with the contractor, including major stream crossings, endhaul sections and disposal sites, heavy gully and fill retrieval, and sections adjacent to sensitive resources, properties and utilities (there may be possible SP amendments for disposal sites)]		
• Timing windows and measures, and all agency requirements		
• Signage needs (refer to *Signage* in Appendix 2)		
• Procedures for administration of payment of works (e.g., use of time cards, invoice content, payment procedures)		
• WCB notification, if required		
• Necessary permits (contractor must confirm that these have been obtained)		

Confirmed that the above items were discussed with: _____

District Specialist (initial): _____ Date: _____

Project Tracking Checklist

Use this checklist to track key sign-offs by consultants and Ministry of Forests staff, and place it in the project file.

Element Signed Off and Placed on File	N/A	Prepared by Prof'l?	Prepared by [Name and Company]	MoF Initial	Date
PLANNING AND DESIGN					
Field reconnaissance report completed (including design specifications)					
Field reconnaissance layout reviewed in field					
Terrain Stability Field Assessment carried out		yes			
Riparian Assessment carried out					
Visual Impact Assessment carried out					
Archaeological Impact Assessment carried out					
Soil Erosion Field Assessment carried out					
Results of assessments or measures incorporated into road design		yes			
Road location survey verified in field					
Road design specifications prepared					
Bridge and major culvert specifications prepared		yes			
Road design/drawings accepted					
Bridge/major culvert/other structures design and drawings accepted		yes			
Modifications to design checked and accepted					
Road and bridge designs checked for compatibility		yes			
Start-Up Meetings completed and filed					

Element Signed Off and Placed on File	N/A	Prepared by Prof'l?	Prepared by [Name and Company]	MoF Initial	Date
CONSTRUCTION					
Modifications to design checked and accepted					
Completion certificate done, showing road construc-ted/modified in general conformance with design					
Road sections in Class IV and V terrain signed off, indicating road built in conformance with design		yes			
Bridges/major culverts/other structures signed off indicating structures built in general conformance with accepted drawings and specifications		yes			
Confirmation signed off that stumps, roots and em-bedded logs will not increase risk of subgrade failure					
Start-Up Meetings completed and filed					
DEACTIVATION					
Professional deactivation prescriptions prepared in moderate or high landslide terrain		yes			
Prescription is signed off by District Manager where required and is consistent with an approved Forest Development Plan					
Roads and structures deactivated in accordance with prescription or approved modification					
Road sections in Class IV or V signed off by a qualified registered professional as being deactivated in general conformance with approved prescription.		yes			
Start-Up Meetings completed and filed					
After permanent deactivation, District Manager initiates deletion process					

Element Signed Off and Placed on File	N/A	Prepared by Prof'l?	Prepared by [Name and Company]	MoF Initial	Date
Database updates:					
Update project files					
Update FRMS/FRATS					
Update of Atlas with GPS as-built traverse					
Administrative follow-up:					
Atlas amendment, restriction or deletion initiated					
Forest Service Road discontinuance initiated					
Atlas amended as required					
Project file is closed					

APPENDIX 2: Support Documents

Advertising

Advertising for works contracts should take into considerations the following:

1. For publicly tendered contracts valued at $100,000 and over, the Internet Contract Advertising System (ICAS) and the *Journal of Commerce* must be used for advertising. The following additional resources are optional to use:
   - regional papers
   - local papers

2. For publicly tendered contracts valued at less than $100,000, public tendering using the ICAS is preferred and should be the usual method of selection. The following resources may also be used for advertising:
   - regional papers, where the local contractor base is small or has become complacent
   - local papers

3. While public tendering using the ICAS is preferred and should be the usual method of selection, a select list may be used if all of the following apply:
   - works are less than $100,000
   - national advertising is used annually to create list
   - the list is short enough that all members on the list can be requested to bid on each project

Bridge and Major Culvert Design	
Step	**Responsibility**
1. Ensure that site plan requirements and bridge/culvert design specifications have been established. Standard specifications apply to class of structure (temporary/permanent), design load, structure location, stream classification, structure size, and drawing number. Site data (including stream flow data and discharge calculations), as well as back-up information for portable structures (obtained, for example, from previous inspections) should be on file (refer to *Project Tracking Sheet* in Appendix 1)	
2. Discuss and/or prepare a conceptual drawing of the crossing for the designer	Regional Engineering Specialist
3. Identify for the designer, before design work begins: • the life expectancy of the structure • the bridge design live loading configuration • the design vehicle for side tracking • fish passage/habitat requirements • navigable waters requirements	
4. Stipulate that the *Forest Service Bridge Design and Construction Manual* is the sole standard	
5. Identify constraints on bridge site selection and confirm the designer's responsibilities	
6. Specify the acceptable outputs at the preliminary and final design stages	
7. Discuss special considerations (e g., portable spans, materials types, etc.) if applicable	
8. Determine whether, based on the Regional Engineering Specialist's assessment, there is a risk to a navigable waterway, and if so, refer design to Transport Canada, Coast Guard	
9. Confirm that the final bridge design is consistent with the vertical and horizontal alignment of the roadway design	Regional Engineering Specialist
10. Review and accept all final bridge designs	Regional Engineering Specialist

Criteria for Day Labour
One or more of the following criteria must apply in order for day labour to be selected as the road construction process.
1. The work was tendered, and bids received from qualified contractors were all unacceptably high (greater than ˚25% compared to the ministry estimate)
2. The work is small in scope
3. The work is difficult to quantify for tender
4. The work is of an emergency nature
5. The road will be built through an area where a contract is undesirable due to the extra care and attention that must be paid given the potential for damage to fish, water quality, wildlife or other resources
6. The project is time-sensitive

Deactivation Prescriptions: Office and Pre-Work

Ensure that all work leading up to the preparation of a deactivation prescription and assessment has been completed. Follow the steps below as a guide:

1. Consider using regional assistance in setting the assessment and prescription formats and contents and in conducting subsequent reviews

2. Where revisions to the levels of deactivation or access are found to be necessary, amend the contractual works accordingly. Typical scenarios:

   - The cost to maintain the road in question cannot be justified (e.g., because of heavy ravelling, the inability to maintain stream crossings, or safety concerns)
   - Instabilities that could potentially impact downslope resources or improvements make total gully retrieval and/or hillslope re-contouring necessary and negate access

3. Review and incorporate referral comments

4. Identify whether a revegetation plan is a component of the prescription. If it is, a Registered Professional Forester may have to prepare the plan separately or review and sign off a plan prepared by someone else

5. In the contract, clearly identify the required outputs: content, format and field markings

6. Ensure that the contract package includes:

   - all pertinent information completed to date, including mapping (of terrain, gully, landslide, riparian area, and fish stream classifications)
   - additional works to be included and defined in the prescription phase, including other assessments, reviews and considerations
   - suitable base mapping for the prescription plan (consider using enlarged air photos to map prescriptions where poor base mapping is the only other option)
   - a map showing the extent of the roads to be prescribed
   - sample of mapping standards
   - a sample of prescription tables and symbols to be used, complete with activity definitions (i.e., P-1, etc.)

7. Use experienced consultants and/or district and regional staff to ensure that top quality contracts will be prepared

Management Quality Assurance

Use this list as a guide when sampling projects to check conformance with administrative and Code requirements.

1. Consider:
   - potential impacts of the activity on other forest resources
   - project supervision and communications
   - costs such as ministry estimate versus contract amount and actual (where applicable)
   - additional planning or operational practices that may have reduced the difference between estimated and actual costs (i.e., increased engineering)
2. Communicate the results of the management review with all involved. Take proactive steps to prevent or ameliorate undesirable outcomes
3. Consider using the help of out-of-district staff to assist in the management review

Modification of Prescriptions and Designs

Prescriptions and designs may be modified to accommodate or respond to unforeseen site conditions, but modifications must still consider impacts on other resources. If the modifications could impact other resources, the District Manager must approve the changes. A note should be placed in the project file summarizing the changes.

The following actions should be taken, depending on the reason for the modification:

1. Soil conditions do not match deactivation prescription or design requirements:
   - Adjust the centreline, cutslope or fillslope angles, and clearing width
   - If the soil occurs in an area with moderate or high landslide hazard, notify the person who prepared the deactivation prescription.

2. Drainage conditions do not match design information:
   - Add or move cross drains or resize culverts. Add or move cross ditches for deactivation
   - Check for sensitivity downslope before placing culverts or constructing deactivation cross ditches
   - Be aware of the potential for fill to seal off seepage zones
   - Be aware of the potential for piping failures

3. Additional pits or quarries are needed or waste management has become an issue:
   - Note limits due to Ministry of Energy and Mines requirements
   - Consider the need for preparing a reserve
   - Design, locate and deactivate pits for proper water management

4. Risk exists of damage to unforeseen habitat or archaeological resources:
   - Stop work, document findings and notify proper agency
   - Restart work only with agency approval

5. Risk exists of damage to utilities and private property:
   - Re-establish legal corners
   - Notify the relevant utilities company
   - Implement the utility company's recommendations and requirements

6. Other reasons:

Notification of Stakeholders

The following is a list of potential stakeholders who may need to be contacted, depending on the nature and extent of the works. Ensure that notification documentation is kept on file.

1. Potential stakeholders to be notified:

- Department of Fisheries and Oceans
- BC Ministry of Environment, Lands and Parks (responsible for fish habitat)
- BC Ministry of Transportation and Highways
- First Nations
- Utilities: BC Hydro, TELUS, railways, gas or oil pipelines, etc.
- Licensed trappers, guides and outfitters
- grazing permittees
- fish hatcheries
- local communities
- community watersheds (notify within 48 hours), Department of Fisheries and Oceans, licensed water users
- local airlines (notify about flyrock)
- boaters (post on-site warnings about flyrock)
- local Fish and Game Clubs
- cross-country ski clubs and snowmobilers
- adjacent licensees
- private property owners
- mineral tenure holders
- others:

2. Notification method:

- local newspaper
- local radio station
- direct personal visits, letters or phone calls
- signage installed on site

Road Layout and Design: Office and Pre-Work

Ensure that all the items below are considered in the road layout and design:

- physical or policy changes that would require modifications of plans and previous projections
- agency referral comments from previous plan submissions
- potential encroachment on private property or other significant boundaries (may require legal survey)
- access to the area (must be feasible not only during the operational season, but also during the time the works are being carried out)
- local, district and regional experience concerning soils and drainage issues and seasonal constraints

Ensure that the survey and geometric design contract package contains the following:

- relevant professional reports
- completed assessments
- maps
- legal boundaries and notes
- road status information
- air photos
- field reconnaissance reports
- flagging standards
- survey level
- geometric design specifications
- output requirements

Safety/Evacuation Plan
A safety/evacuation plan prepared by the contractor, or the Ministry Representative, must be in place before any work begins. The plan must:
1. Specify the geographical location of project
2. Identify available helicopter pad locations (both visually and by GPS co-ordinates)
3. Identify evacuation sites, including GPS co-ordinates
4. State the location of the nearest hospital with directions, travel time and contact number
5. List contractor and ministry emergency contact names and numbers
6. Clearly define reporting procedures and contact responsibilities
7. List outside emergency assistance sources by names, contact numbers and potential or real availability (e.g., Med-Evac, BC Ambulance, Search and Rescue, nearest equipped helicopter or plane base)
8. Provide emergency on-site communication contacts
9. Describe procedures and methods for check-in procedures and radio frequencies
10. State the radio frequencies for both on- and off-site emergency communications
11. Identify emergency transportation vehicle (ETV) requirements (e.g., vehicle, boat and air) by sequence
12. Identify need for survival kits and suits
13. Describe back-up emergency plans

Sediment Control Tools

Consider using the following sediment control tools wherever construction or modification is taking place in or around streams that would be affected by a reduction in water quality. More items can be added to the list to reflect a higher risk to other forest resources or stakeholders, or where the materials are not readily available from the normal sources.

- geotextiles
- silt fencing
- hay bales
- plastic sediment filters
- sand bags or plastic bags
- tarpaulins
- silt/culvert socks
- volume pumps, complete with tools, gas, suction hose and various lengths of hose
- various lengths and diameters of polyethylene pipe
- support supplies for all equipment

Shutdown Criteria and Procedures

Any person working on site must shut down the works if there is sufficient risk to safety or to environmental or forest resources.

A. Shut down any works if:

1. a situation exists that creates a safety hazard to workers, the public and adjacent properties and utilities

2. anything about maps or prescriptions is unclear, or the objectives of plans cannot be achieved

3. the activity may result in damage to a forest resource, for example:

   - fish and wildlife habitat (threatened, endangered or regionally important species)
   - cultural heritage resource (culturally modified tree, archaeological remains);
   - recreational facility or a feature of biological, physical, cultural, historic or scenic significance
   - cave or Karst formation
   - domestic water supply intake or related infrastructure
   - stream, lake or wetland, marine- or fisheries-sensitive zone
   - an experimental project (e.g., growth-and-yield plot)
   - a snow course, or a range development

If in doubt about a forest resource, notify your supervisor.

4. the amount of local rainfall or snowmelt is sufficiently great within a previous 12-hour period to justify shutdown, or if district rainfall limits (where they exist) are exceeded

B. Shut down work prior to the following occurrences, where predictable:

1. sediment transport cannot be controlled

2. slope stability is in question, or landslides occur

3. windfall is happening around or near the site

4. road surface deteriorates and vehicle traffic damages the road

5. activities damage adjacent stands and plantations

6. activities damage soils and inhibit future reforestation

7. fuel or explosives spills have occurred

C. In case of shutdown, follow these procedures:

1. Stop the activity and park equipment in a safe place; avoid riparian areas or areas with excessive soil moisture, steep road sections and side hills, and timber edges (blowdown)

2. Take any steps necessary to avoid non-compliance impacts

3. Document and report the shutdown to the supervisor

4. Account for all people working in the area before leaving the site

It is the responsibility of the Ministry Representative to establish, and convey to the site supervisor, criteria for restarting works including any further mitigation measures.

Signage

Traffic control signs must conform to the* Uniform Traffic Control Devices for Canada *manual.

Works signage:

Trucks Entering
Blasting Area (includes whistle signals, "turn off radios," etc.)
Grader Working
Temporary Road Closures/Restrictions (for road repairs, brush cutters, forestry activities, etc.)
Crew and Equipment Working
Flag Person Ahead
Road Deactivation in Progress
Overnight hazard warning (barricades/flashing lights)
Other (specify):
Hammer mark
Active Falling (no entry)
Active Hauling

Traffic control signage:

Forest Service Road identification
Kilometre identification
Radio communication system in use (frequency, etc.)
Maximum weight and sizes
Gate Ahead (installed from both directions)
Road Closed (at km ____)
Road Closed to Vehicles Without Permit
Icy Conditions
Avalanche Area (no stopping)
Rockfall Area (no stopping)
Overhead hydro line clearance (requirements/boon lowering, etc.)
Truck Stop Check Point Ahead
Load Limit (bridge and restrictions)
Bridge Warning (installed from both directions in conjunction with delineators)
Do Not Proceed
Stop/Yield
Warning signs for road alignment, widths, visibility, etc., as required
No Dumping (of litter)
Restricted Parking
Snowmobile Crossing (designated crossing)
Trail Crossing (designated crossing for people, etc.)

Establish responsibilities for signage at the contract preparation stage, including who will order, supply, erect, maintain and remove temporary/operational signs.

Spill Plan

A spill plan must be in place and signed off as a contractual requirement before any work begins. Spills that are defined as "reportable" must be reported to the Provincial Emergency Program (PEP). The plan must:

1. List the spill response equipment required for incidents ranging from minor hydraulic leaks to major watercourse spills
2. Identify spill kit requirements (at a minimum, each machine must have a spill kit, with extra absorbents in the support vehicle). The contents of a spill kit are determined by the works, type of spill, and impact potential
3. Define organization and responsibilities
4. List notification procedures and contact numbers (e.g., for the works foreman, Ministry of Forests, Ministry of Environment, Lands and Parks, Department of Fisheries and Oceans, PEP, downstream users, etc.)
5. Identify locals factors that influence the plan
6. Describe discovery, notification and alerting procedures. (Notification requirements are determined by the extent and type of spill)

For mandatory reportable spill criteria, contacts, procedures, contingency plan, etc., refer to the Summary of Environmental Standards and Guidelines for Fuel Handling, Transportation, and Storage *(2nd edition) available from offices of the Ministry of Environment, Lands and Parks and the Ministry of Forests*

Works Contract Documents

(Road Layout and Design, Construction, Modification, Deactivation)

Check that contract documents are complete and contain the following items:

- Work schedule
- Evidence of WCB coverage
- Securities information:
  - a performance bond (for projects of $200,000 or greater, or for projects located in extremely isolated sites)
  - labour and material payment bond for bridge and major culvert projects (where a performance bond is also required)
  - receipt and agreement
  - other security:

  (refer to the Ministry of Forests' *Contract Management Manual*)
- Insurance
- Equipment list
- Stipulation that the contractor prepare (and implement where necessary) a safety/evacuation plan (refer to *Safety/Evacuation Plan* in Appendix 2) and a spill plan (refer to *Spill Plan* in Appendix 2)
- Stipulation that the contractor have appropriate fire tools and equipment on site
- Stipulation that the contractor provide operational signage as needed for the works (refer to *Signage* in Appendix 2)